Fetal growth restriction: current perspectives

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Summary

Intrauterine growth restriction is one of the most common and complex problems in modern obstetrics. The cutoff value mainly used for defining an IUGR is at the 10th percentile. There are many evidence demonstrating that the adverse perinatal outcome are mainly confined to infants below the 5th or 3th percentile. The mains causes for the onset of IUGR can be divided into three categories: maternal, fetal and placental. Aim of this study is to obtain a review from which speculate usefull indication in clinical practice. Evidence from randomized controlled trials finds few interventions beneficial in preventing or treating IUGR.

Key Words: intrauterine growth restriction; fetal weights; small for gestational age.

Introduction

Intrauterine growth restriction is one of the most common and complex problems in modern obstetrics. In fact, there is some confusion in terminology for the lack of uniform diagnostic criteria. Furthermore almost of authors use the terms small for gestational age (SGA) and intrauterine growth restriction (IUGR) as synonymous. Others authors think that the term SGA is more appropriate referring to infant while IUGR referring to fetus. By definition, 10% of people in any population have a weights, as well as heights, below the 10th percentile. This is the cut-off value mainly used for defining the IUGR. A minority of authors define the cut-off value at the 5th or at 3th percentile. There are many evidence demonstrating that the adverse perinatal outcome are mainly confined to infants below the 5th or 3th percentile (1).
There are two distinct causes that can determine an IUGR: constitutional smallness and pathological growth restriction. Mortality and morbidity of constitutional small babies are very lower than pathological growth restricted (2).
It is very important specify that fetal growth depends by two broad and overlapping stages during the pregnancy. During the first period the growth is characterized as a germinal and embryonic period while during the last period there is a differentiation's prevalence depending by genetical characteristics. This is the reason because there is less biologic variability in growth during the first period of pregnancy. On the contrary, there is an increasing variability during the pregnancy progress. We can then speculate that the biological variations in fetal size is mainly a third trimester phenomenon.
The fetal growth is determined by a plethora of maternal, fetal and placental factors (3, 4). The literature recognized many risk factors strictly related with IUGR. Some examples for this conditions are: hypertension, renal disease, diabetes, restrictive lung disease, cyanotic heart disease, multiple gestation, hemoglobinopathies, smoking, substance abuse, malnutrition, low socioeconomic status, low prepregnancy maternal weight, extremes of reproductive age (younger than 16 years or older than 35 years). Sometimes it's difficult to identify a specific cause for IUGR. The mains ones for the onset of IUGR can be divided into three categories: maternal, fetal, placental. Among the maternal ones it's very important to remind all medical conditions affecting the microcirculation that cause fetal hypoxiemia, vasoconstriction or a reduction in fetal perfusion (5). Hypertension, typically in preeclampsia, is a relatively common example as well as severe chronic diseases like renal insufficiency, systemic lupus erythematosus, chronic anemia, or pregestational diabetes (6, 7). Other principal reasons are the behavioral conditions including substance abuse, (alcohol or eroin) or smoking. Among the placental ones we remember the most common causes of SGA in non-anomalus fetus: impaired placental perfusion and placenta

(8). Placenta previa is one of the well recognized pathology determining IUGR, as consequence of the abnormal placental implantation that it's very important for a good oxygenation and nutrition of fetus. Finally we underline some relatively rare primary pathological condition, such as mosaicism, chorioangioma (9), infarcts or partial abruptions. The last category of pathological condition comprises the fetal diseases. The major cause of IUGR are the chromosome anomalies (5-10). Infective diseases or exposure to teratogens are others very well known causes.

Aim of the study

In this study we analyzed some interesting article concerning IUGR and summarized these data to obtain a review from which speculate usefull indication in clinical practice.

Diagnosis and management

The antenatal diagnosis of IUGR involves two different steps: the elucidation of maternal risk factors and the ultrasonographic assessment of fetal size evenctually supplemented by invasive fetal testing. The clinical determination of fetal size can be obtained by several methods, the most common of which is an objective measurement. However these techniques are considered affected by high inaccuracy (11, 12). It has been demonstrated that an incorrect diagnosis occurs in 50% of cases while an undetected IUGR in about one third. Before birth the diagnosis of IUGR is not precise. The more widely adopted methods to determinate fetal weight include ultrasonographic assessments, head-femur to abdomen ratios, or serial observation of biometric growth patterns. Interestingly some authors consider amniotic fluid (AF) an "important and prognostic parameter in fetuses with IUGR" whereas some other authors assign to AF a minimal value in diagnosing an inadequate growth.
It's largely accepted that once a IUGR is suspected sonografically a specific examination should be performed. An amniocentesis should be done in cases of early or severe IUGR or if there are associated anomalies. Assessment of chromosomal defects should be done if there are anomalies, if abdominal circumference (AC) or estimated fetal weight (EFW) is less than 5%, or if AF or Doppler is normal. However, once a nonanomalous IUGR is identified many authors recommend some antenatal surveillance, even if there is a lack of randomized controlled trials regarding which is the best method to perform this supervision. All authors agree on use of umbilical artery Doppler (UA) in the management of IUGR. The use of UA Doppler, compared with cardiotocografy (CTG), reduces the use of resourse in the management of abnormal growth. However most intervention don't prevent or improve the perinatal outcomes. Smoking cessation may increase the birth weight but doesn't improve the outcome.
Once extrauterine survival is possible, delivery may be considered if fetal assessment is nonreassuring or if there is complete absence of growth over 2-4 weeks. If end diastolic velocity is absent or reversed, then hospitalize, administer steroids, and monitor closely with biophysical profiles and venous Doppler, delaying delivery until 34 weeks, if reassuring.
Many authors review the literature on this topic and classify their recommendations as level A, B or C. The level C suggestions are based primarily on expert committee reports or consensus of expert opinion. The level B recommendations have a limited or inconsistent scientific evidence. The level A recommendations have a good and consistent scientific evidence which doesn't need randomized controlled trials. The very known practice bulletin of ACOG [American College of Obstetricians and Gynecologists, (13)], that it's one of the most famous source of informations concerning this topic, gives only 2 A level recommendations and 2 C level recommendations.

Discussion

There are many evidence demonstrating that SGA babies delivered at preterm gestations are more likely to be pathologically growth restricted whereas SGA babies delivered at term gestations are more likely to be constitutionally small is supported by many studies. Some authors done studies demonstrating that neonatal morbidity and mortality were significantly higher among term infants that were at or below the 3rd centile (14). In contrast, for babies that were delivered at preterm gestations, morbidity and mortality were increased at all birthweitht thresholds. This evidence is in agreement with our observation that SGA babies delivered at preterm gestations are likely pathologically growth restricted and that neonatal mortality is increased at all birthweight for gestational age thresholds up to the 10th centile. Some authors used data on 18 million singleton infants delivered in the U.S.A. between 25 and 42 weeks gestation to compare risks of neonatal mortality in relation to various birthweight for gestational age cutoff. In comparison to mortality risk among babies between the 45th and 55th centiles for gestational age, they found that the risk of mortality for sga (below the 10th centile) babies varied by gestational age ranging from 30 , at 26 weeks, to 1,13 at 40 weeks (15).
SGA babies that are asymmetrical are almost always pathological, presumably due to uteroplacental insufficiency that portends late in gestation. In contrast, SGA babies that are symmetrical could be either pathological or constitutionally small. Mortality, in SGA babies compared with appropriate one, shows us a risk 5 times higher.
Babies delivered at early (preterm) gestations are at increased risk of mortality, regardless of SGA status. Some authors (6) emphasizes risk factors and AF level to enhance the diagnosis others emphasizes the use of ultrasound charts to enhance detection (16, 17).
We can summarize all the data explained in this work saying that the general approach to management of fetus with ultrasonographically suspected IUGR involves risk factor modification when possible and the initiation of antepartum fetal surveillance, ultrasonography, and delivery when the risk of continued in uterus development outweigh the benefits.
The risks to the growth – impaired fetus are well documented. Currently, although the incidence of IUGR has not changed appreciably, the prognosis for SGA infants has improved dramatically. It must be emphasized, however, that perinatal morbidity and mortality will continue to occur despite optimal management of the fetus with suspected IUGR. In those fetuses managed expectantly, antepartum injury or death may occur because current methods of fetal surveillance are less than perfect in the prediction of fetal outcome.

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